

Claims

[c1] What is claimed is:

1.A voltage generator, comprising:

a positive temperature coefficient current generating module, wherein an output current of the positive temperature coefficient current generating module increases with a rising ambient temperature;

a negative temperature coefficient current generating module wherein an output current of the negative temperature coefficient current generating module decreases with a rising ambient temperature;

a current fine-tune module used for adjusting the output current of the negative temperature coefficient current generating module; and

a voltage output module, connected to the positive temperature coefficient current generating module and the negative temperature coefficient current generating module for generating an output voltage according to the positive temperature coefficient current generating module and the negative temperature coefficient current generating module.

[c2] 2.The voltage generator in claim 1 wherein the current

fine-tune module is connected to the negative temperature coefficient current generating module for effecting fine increases in the output current of the negative temperature coefficient current generating module.

[c3] 3.The voltage generator in claim 1 wherein the current fine-tune module is connected to the negative temperature coefficient current generating module for effecting fine decreases in the output current of the negative temperature coefficient current generating module.

[c4] 4.The voltage generator in claim 1 wherein the current fine-tune module comprises a fine-tune unit.

[c5] 5.A voltage generator, comprising:
a positive temperature coefficient current generating circuit, which comprises a first NMOS device, a second NMOS device, a resistor, and a current mirror, a gate of the first NMOS device being connected to a drain of the first NMOS device and a gate of the second NMOS device, a source of the first NMOS device being connected to ground, a source of the second NMOS device being connected to ground through the resistor, the drain of the first NMOS device and a drain of the second NMOS device being connected to the current mirror, the current mirror being used for mirroring a current through the resistor generating an output current;

a negative temperature coefficient current generating circuit comprising a first NMOS device, a second NMOS device, a resistor, and a current mirror, a gate of the first NMOS device being connected to ground through the resistor, a source of the first NMOS device being connected to ground, a drain of the first NMOS device being connected to the current mirror of the positive temperature coefficient current generating module, a source of the second NMOS device being connected to the gate of the first NMOS device, a gate of the second NMOS device being connected to the drain of the first NMOS device, a drain of the second NMOS device being connected to the current mirror of the negative temperature coefficient current generating module for mirroring a current through the second NMOS device to generate an output current; and

a voltage outputting circuit, connected to the positive and the negative temperature coefficient current generating circuits for generating an output voltage according to the output currents of the positive and the negative temperature coefficient current generating circuits.

- [c6] 6. The voltage generator in claim 5 further comprising a current fine-tune circuit, the current fine-tune circuit being connected to the negative temperature coefficient current generating circuit for fine increasing or decreasing

ing of the output current of the negative temperature coefficient current generating module.

[c7] 7. A voltage generating method comprising operate the second NMOS device of the positive temperature coefficient current generating circuit and the first NMOS device of the negative temperature coefficient current generating circuit in the sub-threshold region so that the voltage outputting circuit of claim 5 is able to generate a stable output voltage.

[c8] 8. A voltage generator, comprising:
a positive temperature coefficient current generating circuit comprising a first PMOS device, a second PMOS device, a resistor and a current mirror, a gate of the first PMOS device is connected to a drain of the first PMOS device and a gate of the second PMOS device, a source of the first PMOS device is connected to a power supply, the source of the second PMOS device being connected to the power supply through the resistor, the drains of the first and the second PMOS devices being connected to the current mirror, the current mirror being used for mirroring a current through the resistor generating an output current;
a negative temperature coefficient current generating circuit comprising a first PMOS device, a second PMOS device, a resistor, and a current mirror, a gate of the first

PMOS device being connected to the power supply through the resistor, a source of the first PMOS device being connected to the power supply, a drain of the first PMOS device being connected to the current mirror of the positive temperature coefficient current generating module, a source of the second PMOS device being connected to the gate of the first PMOS device, a gate of the second PMOS device being connected to the drain of the first PMOS device, a drain of the second PMOS device being connected to the current mirror of the negative temperature coefficient current generating module for mirroring a current through the second PMOS device to generate an output current; and
a voltage outputting circuit, connected to the positive and the negative temperature coefficient current generating circuits for generating an output voltage according to the output currents of the positive and the negative temperature coefficient current generating circuits.

- [c9] 9. The voltage generator in claim 8 further comprising a current fine-tune circuit, the current fine-tune circuit being connected to the negative temperature coefficient current generating circuit for fine increasing or decreasing of the output current of the negative temperature coefficient current generating module.

[c10] 10.A voltage generating method comprising operate the second PMOS device of the positive temperature coefficient current generating circuit and the first PMOS device of the negative temperature coefficient current generating circuit in the sub-threshold region so that the voltage outputting circuit of claim 8 is able to generate a stable output voltage

11.A voltage generator, comprising:

a positive temperature coefficient current generating circuit comprising a first PMOS device, a second PMOS device, a resistor and a current mirror, a gate of the first PMOS device is connected to a drain of the first PMOS device and a gate of the second PMOS device, a source of the first PMOS device is connected to a power supply, the source of the second PMOS device being connected to the power supply through the resistor, the drains of the first and the second PMOS devices being connected to the current mirror, the current mirror being used for mirror a current through the resistor generating an output current;

a negative temperature coefficient current generating circuit comprising a first NMOS device, a second NMOS device, a resistor, and a current mirror, a gate of the first NMOS device being connected to ground through the resistor, a source of the first NMOS device being connected to ground, a drain of the first NMOS device being con-

nected to the current mirror of the positive temperature coefficient current generating module, a source of the second NMOS device being connected to the gate of the first NMOS device, a gate of the second NMOS device being connected to the drain of the first NMOS device, a drain of the second NMOS device being connected to the current mirror of the negative temperature coefficient current generating module for mirroring a current through the second NMOS device to generate an output current; and
a voltage outputting circuit, connected to the positive and the negative temperature coefficient current generating circuits for generating an output voltage according to the output currents of the positive and the negative temperature coefficient current generating circuits.

[c11] 12.The voltage generator in claim 11 further comprising a current fine-tune circuit, the current fine-tune circuit being connected to the negative temperature coefficient current generating circuit for fine increasing or decreasing of the output current of the negative temperature coefficient current generating module.

[c12] 13.A voltage generating method comprising operate the second PMOS device of the positive temperature coefficient current generating circuit and the first NMOS device of the negative temperature coefficient current generat-

ing circuit in the sub-threshold region so that the voltage outputting circuit of claim 11 is able to generate a stable output voltage

14. A voltage generator, comprising:

a positive temperature coefficient current generating circuit, which comprises a first NMOS device, a second NMOS device, a resistor, and a current mirror, a gate of the first NMOS device being connected to a drain of the first NMOS device and a gate of the second NMOS device, a source of the first NMOS device being connected to ground, a source of the second NMOS device being connected to ground through the resistor, the drain of the first NMOS device and a drain of the second NMOS device being connected to the current mirror, the current mirror being used for mirror a current through the resistor generating an output current;

a negative temperature coefficient current generating circuit comprising a first PMOS device, a second PMOS device, a resistor, and a current mirror, a gate of the first PMOS device being connected to the power supply through the resistor, a source of the first PMOS device being connected to the power supply, a drain of the first PMOS device being connected to the current mirror of the positive temperature coefficient current generating module, a source of the second PMOS device being connected to the gate of the first PMOS device, a gate of the

second PMOS device being connected to the drain of the first PMOS device, a drain of the second PMOS device being connected to the current mirror of the negative temperature coefficient current generating module for mirroring a current through the second PMOS device to generate an output current; and
a voltage outputting circuit, connected to the positive and the negative temperature coefficient current generating circuits for generating an output voltage according to the output currents of the positive and the negative temperature coefficient current generating circuits.

[c13] 15. The voltage generator in claim 14 further comprising a current fine-tune circuit, the current fine-tune circuit being connected to the negative temperature coefficient current generating circuit for fine increasing or decreasing the output current of the negative temperature coefficient current generating module.

[c14] 16. A voltage generating method comprising operating the second NMOS device of the positive temperature coefficient current generating circuit and the first PMOS device of the negative temperature coefficient current generating circuit in the sub-threshold region so that the voltage outputting circuit in claim 14 is able to generate a stable output voltage.